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Spring 2007

Regional Block Preferred Mode For Shoulder Ops

Every surgeon and anesthesiologist is aware of the complications associated with general anesthesia. When regional anesthesia is presented as an alternative, some anesthesiologists feel insufficiently trained to perform it, and many surgeons cite high failure and complication rates. According to A. Robin Brown, MB, ChB, at New York-Presbyterian Hospital/Columbia University Medical Center, the benefits to patients outweigh these concerns, especially once anesthesiologists are comfortable with the procedure.

"It can be difficult to overcome the distrust of surgeons in this area," said Dr. Brown. "Unless you're fairly experienced in this type of anesthesia, the failure rate can be quite significant—a good 15% to 20% or more, and the complication rate is high as well. We've been doing this for many years now, and our success rate is close to 100%. The complication rate is extremely small."

Dr. Brown's enthusiasm has been well received by the orthopaedic surgeons with whom he works. "Interscalene block anesthesia has made a significant improvement in the management of a patient's post-operative pain," said Louis U. Bigliani, MD. "I think it has really improved our short-term results with shoulder surgery. It dramatically improves patient pain in the immediate post-op period, and I think it has allowed us to get patients moving quickly into rehabilitation as well as

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Surgeons Refine Techniques For Reverse Shoulder Arthroplasty

When patients with shoulder arthritis tear their rotator cuffs, the results can be devastating. Although symptoms are not severe in all cases, rotator cuff-deficient shoulder arthritis may present as a "pseudoparalysis"—so great are the immobility and pain of the affected joint. Historically, surgery for this condition has yielded unpredictable outcomes.

Today, orthopaedic surgeons have a new procedure that is effective in selected patients. The procedure—reverse shoulder arthroplasty—is currently being used, refined, and studied at the Center for Shoulder, Elbow and Sports Medicine at NewYork-Presbyterian Hospital/Columbia University Medical Center.

Reverse shoulder arthroplasty uses a specially designed ball-and-socket prosthesis, which became available in the United States in 2004. The surgeon implants the convex, ball portion of the prosthesis and its baseplate at the glenoid. A shaft that terminates in a concave socket is implanted in the humerus. The prosthesis is "reverse" because it places the ball at the glenoid and the socket in the humerus, whereas in the human shoulder, the ball is the end of the humerus and the socket is the

Photo courtesy of William N. Levine, MD.

X-ray shows a patient with rotator cuff-deficiency and arthritis.

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Questions, comments, suggestions?
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UPDATES

NewYork-Presbyterian Hospital
Columbia University Medical Center

Sports Injuries in Young Patients Prompts Novel Surgical Techniques

Injuries from playing sports can be difficult to treat in children and adolescents. Most surgeries designed to repair serious injuries sustained by adults may not be appropriate for patients whose musculoskeletal systems are not fully developed. Additional treatments or modified surgical techniques may be needed to avoid growth disturbances in adolescent patients. Young athletes also are often unaware of how serious their injuries are, so that damaging delays occur before treatment is obtained.

"Many young patients get injured and do not realize the magnitude of the injury because they have never been injured before," said Christopher S. Ahmad, MD. "Throwing athletes often throw despite pain and create a serious injury that may have been preventable. If an athlete with, for example, an ACL [anterior cruciate ligament] injury does not seek medical care, he or she may go on to develop meniscal and cartilage injuries that create pain and difficulties in treatment and long-term function."

Morgan Stanley Children's Hospital of NewYork-Presbyterian/Columbia University Medical Center is the only children's hospital in the region with a Center specializing in the treatment of adolescent and pediatric sports injuries. At the Center for Pediatric and Adolescent Sports Medicine, Dr. Ahmad focuses on surgical techniques to repair injuries to the shoulder, knee, and elbow. He also conducts research into trends in sports medicine and the efficacy of the procedures used to treat adolescents.

Dr. Ahmad and colleagues recently published a study showing that girls are 8 times more likely than boys to sustain injuries of the ACL while playing sports, in part because of muscle imbalances present only in girls (*Am J Sports Med* 2006;34:370-374).

After treating an injury, Dr. Ahmad teaches patients to change the way they stand and move and encourages them to strengthen the muscles that support their most vulnerable ligaments. He recently initiated a project focusing on ACL screening tests that may help to prevent these injuries in high-risk patients.

"Currently there is an epidemic of ACL injuries in young female athletes," he said, "and also younger adolescent male athletes. In addition, there are increasing shoulder and elbow injuries resulting from overuse in throwing sports. These specifically include medial collateral ligament injuries of the elbow and labral injuries in the shoulder."

Dr. Ahmad's focus on sports-related injuries began when he was a young athlete. "While studying engineering at Columbia University, I became interested in developing methods to enhance athletic performance and prevent injuries. I found it natural to apply engineering principles to orthopaedic science and sports medicine." Currently, Dr. Ahmad is the Director of Biomechanics Research at the Center for Orthopaedic Research at Columbia University.

Dr. Ahmad has developed several surgical techniques that are better suited to the needs of young patients. Having seen firsthand the social and parental pressures that many young athletes face, as well as how difficult it can be for a child or adolescent to undergo surgery and the requisite rehabilitation, he works with coaches and teachers to develop ways to help budding athletes avoid injury in the first place.

"The challenge of sports medicine is to always improve our prevention and treatment of injuries through clinical and basic science studies as well as surgical technique," he said. "Adolescent patients have future athletic careers and the impact of treatment is immense. They require more specialized care because of their growing bodies, and they face increasing athletic demands and pressures, putting them at risk for specific injuries."

Dr. Ahmad and his colleagues examine each patient carefully to determine the best combination of surgical and nonsurgical techniques for treating the patient's injury, taking note of relevant factors, such as skeletal maturity.

Photo courtesy of Christopher S. Ahmad, MD.

An adolescent patient undergoes anterior cruciate ligament reconstruction surgery.

"Currently there is an epidemic of [anterior cruciate ligament] injuries in young female athletes. In addition, there are increasing shoulder and elbow injuries resulting from overuse in throwing sports."

—Christopher S. Ahmad, MD

"The most challenging decision making I face is when treating a growing adolescent athlete with an ACL tear," Dr. Ahmad said. "With nonoperative treatment, the patient has a high risk of developing meniscal and cartilage injuries that can lead to chronic pain and loss of function. Standard operative treatment may inhibit the athlete's remaining growth. Therefore, specialized techniques are utilized to reduce the risk of iatrogenic injury to the immature growth plate."

The surgeons at the Center for Pediatric and Adolescent Sports Medicine have developed special surgical techniques for children and adolescents who have sustained serious sports injuries.

"Something that is unique and has been developed here is a surgery for young patients who have dislocated the patella. The technique is called medial patellofemoral ligament reconstruction," said Dr. Ahmad.

Young athletes who dislocate the patella have poor outcomes, said Dr. Ahmad. They continue to dislocate their patella and injure cartilage inside the knee, which can result in premature arthritis. "Bracing, rehab, all those things don't work. There are many operations for patellofemoral alignment, and some of them have relied on cutting bone and moving bone to change the alignment of the knee. Those are big operations; they are associated with increased morbidity, long recovery time, and complications," said Dr. Ahmad.

In medial patellofemoral ligament reconstruction, surgeons harvest the tendon in the knee and attach it from the patella to the femur. The ligament then acts as a restraint for the patella so it will not dislocate again.

"We've done about 30 cases in the last 2 years. We are getting ready to report those results now that we have a 2-year follow up."

Dr. Ahmad noted that some of these techniques have been so successful that they have overcome the associated difficulties in recovery. "With newer techniques," he said, "the benefits of surgery outweigh the benefits perceived advantage of nonoperative treatment and allow accelerated recovery."

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Surgeons Find Advantages To Using Arthroscopy for Lateral Epicondylitis

How can physicians treat tennis elbow and keep patients at the top of their game? At the Center for Shoulder, Elbow and Sports Medicine at NewYork-Presbyterian Hospital/Columbia University Medical Center, orthopaedic surgeons use a variety of approaches to treat patients with lateral epicondylitis.

According to Theodore A. Blaine, MD, lateral epicondylitis is a common, painful, but eminently treatable condition. "In my own clinical practice, I see 20 cases of tennis elbow per week. About half of all people aged 40 to 60 years who play tennis regularly will develop tennis elbow at some point," said Dr. Blaine. Occupations that involve manual labor or other repetitive stress on the arm can also produce tennis elbow. Pain, noted Dr. Blaine, "results from the inflammation and degeneration of the extensor carpi radialis brevis [ECRB] tendon in the elbow, which occurs with overuse of the joint."

In 9 out of 10 patients, a conservative management approach is used to treat tennis elbow, which includes cortisone injection to the affected site, physical therapy, and anti-inflammatory medication. For 10% of patients, however, chronic and refractory symptoms require surgical intervention. At the Center for Shoulder, Elbow and Sports Medicine, orthopaedic surgeons use arthroscopic techniques to treat such patients. The procedure involves removing inflamed tissue from the ECRB; the region of excised tendon fills with noninflammatory scar tissue, relieving pain.

Arthroscopic surgery for lateral epicondylitis has been shown to be more than 90% effective, according to a report by pioneers of the technique, Champ L. Baker, MD, and coworkers at Hughston Clinic, Columbus, Ga. "The goal," said Dr. Blaine, "is for people to play tennis well and perform other activities comfortably. The surgery takes care of the problem for good."

> "We will only do an open procedure if there is a large tear in the ECRB tendon."
>
> —*Theodore Blaine, MD*

At many health centers in the United States, surgeons routinely perform surgery for tennis elbow using traditional open surgical techniques. At NewYork-Presbyterian/Columbia Orthopaedics, "we will only do an open procedure if there is a large tear in the ECRB tendon. Otherwise, we perform the procedure arthroscopically," said Dr. Blaine.

In an arthroscopic procedure, the surgeon uses the resector or probe to release the ECRB tendon from its attachments to humeral and radial bone, first at the lateral epicondyle, a projection of the humerus at the elbow, and then at the radial head. The ECRB tendon can then be debrided using several instruments suitable for the removal of inflamed tissue.

Arthroscopy for tennis elbow has many advantages compared with open surgery, according to Dr. Blaine. "The incision is smaller, the pain is less, and the return to activity is faster," making arthroscopy the superior surgical option for most patients.

Because conservative management of tennis elbow is so frequently indicated and effective, physicians at the Center for Shoulder, Elbow and Sports Medicine also continue to refine their nonsurgical protocols.

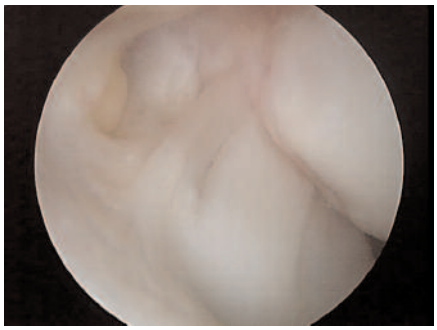

Photo courtesy of Theodore A. Blaine, MD.

Insertion of an arthroscope allows doctors to visualize the elbow joint in real-time video.

Currently, a Columbia research team is conducting a laboratory study to compare the performance of two different techniques for joint injection of cortisone: injection to the ECRB tendon versus injection to the joint. In tennis elbow, degeneration of the joint capsule, the complex of fibrous tissue and synovial membrane that envelops the joint, may accompany degeneration of the tendon. Therefore, the team has hypothesized that an injection in the joint, rather than the tendon, could enhance the efficacy of treatment. Joint injection is also less painful than tendon injection and poses less risk to adjacent nerve structures. Localization of injections has been made as accurate as possible by anatomic dissection studies.

"Studies like this," said Dr. Blaine, "help us improve nonsurgical treatment for the benefit of the patients we see." Thus, a patient with tennis elbow treated at NewYork-Presbyterian/Columbia Orthopaedics can be confident that all interventions—medical or surgical—are the best available.

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Surgeons Treat Complex Hand Injuries in Major League Ballplayers

In 1987, Stuart J. Hershon, MD, became the head team physician and orthopaedic surgeon for the New York Yankees. Since his training was in knee and shoulder surgery, Dr. Hershon began looking for a hand surgeon he could consult when severe upper extremity injuries required the attention of a specialist. Within a year, he found one: Melvin P. Rosenwasser, MD.

In conjunction with the Center for Shoulder, Elbow and Sports Medicine at NewYork-Presbyterian Hospital/Columbia University Medical Center, the orthopaedic surgeons treat and care for injured professional athletes.

As head team physician, Dr. Hershon oversees the treatment of any injury sustained by a member of the Yankees, and also takes care of emergent situations with visiting teams. "Occasionally, there is a visiting player who gets hurt at Yankee Stadium," he said, "and if there's a hand issue that I feel we need to discuss, I call Dr. Rosenwasser. He consults for me when our players get hand, wrist, or elbow injuries such as specific fractures, tendon or ligament ruptures, and some chronic joint instability presentations."

Although Dr. Rosenwasser has an active practice treating hand, wrist, and elbow injuries of all types for the Center's Hand and Orthopaedic Trauma Services, he's very proud of his work with the Yankees, and takes it very seriously. "You always have to be available," he said. "You get the phone calls at all hours of the day or night, and if someone has to be seen, you see them, right away. The responsibility requires flexibility in one's schedule."

Dr. Hershon performs preliminary screenings and diagnosis, determining whether a consultant needs to be brought in. "Sometimes there are a lot of hand injuries in a season, sometimes not," he said. "Like anything else, it goes in streaks. You never know when injuries are going to happen."

The acute injuries that immediately remove a player from the lineup are the ones that get the most media attention, but Dr. Rosenwasser also treats players for attritional chronic injuries that occur over a lifetime of throwing balls and swinging bats, such as compression neuropathies and bone chips inside joints. "Sometimes with catchers, the ball hits their hand over and over again at 90-plus miles per hour and then their fingers go numb," he said. "We cared for a player who had an aneurysm in his shoulder resulting from overhead activity during a lifetime, compressing the vessels in his arm, leading to a clot and diminished blood flow."

> "We cared for a player who had an aneurysm in his shoulder resulting from overhead activity over a lifetime."
>
> *—Melvin P. Rosenwasser, MD*

A key part of Dr. Rosenwasser's work for the Yankees is assisting Dr. Hershon in evaluating the physical condition of players before a trade or contract signing. He also helps to predict whether an injured player is likely to be out of commission for more than 2 weeks, as that allows the team to put the player on the disabled list and replace him with another player. When serious injuries occur later in the season or affect starting players, situations can get very tense, but the medical decisions are left in the hands of Dr. Hershon and his consulting staff.

"The Yankee baseball club is a wonderful, professional organization and they do not influence the medical decision making," Dr. Rosenwasser said. "No matter what's at stake—the biggest game of the year, the World Series—if the player is not ready, they accept that opinion at face value."

"Sometimes we evaluate cases together to determine whether a patient needs surgery. If it's an emergency or something that I feel can be treated at the Stadium, I'll have {Dr. Rosenwasser} come over, but otherwise we send patients to the Hospital," said Dr. Hershon.

If Dr. Rosenwasser evaluates a patient and determines that surgery is necessary, Dr. Hershon scrubs in and joins him in the operating room, supervising every detail of the player's care.

In some cases, players will see physical therapists and rehabilitation specialists at NewYork-Presbyterian/Columbia Orthopaedics, but the Yankees' training staff handles most post-injury rehabilitation, either between games or in the training facility in Tampa, Fla.

The proximity of NewYork-Presbyterian/Columbia to Yankee Stadium is extremely convenient: It is a 10-minute drive if traffic is light, and the Stadium can be seen from the roof. Dr. Rosenwasser emphasized, however, that the hospital doesn't rely on proximity alone to maintain its relationship with the Yankees. "This association, which was initiated by Dr. Hershon, has continued over the last 20 years because of satisfaction with the level of care," he said. "Everything is expedited when a player gets here, from the security guard helping to park the car out front to the X-ray technicians who get them in and out very quickly, obviously with the proper privacy being maintained. We do everything we can to give them the best care possible."

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getting out of the hospital and home sooner."

The first collaboration between the 2 physicians took place in 1990, when Dr. Brown suggested using an interscalene block for a patient who was scheduled for a shoulder replacement. "It was a roaring success," he said. "Once the surgeons saw the benefits of this and how happy the patients were, they bought in immediately." Now Dr. Bigliani estimates that 95% of shoulder surgery performed at New York-Presbyterian/Columbia is done under interscalene block anesthesia.

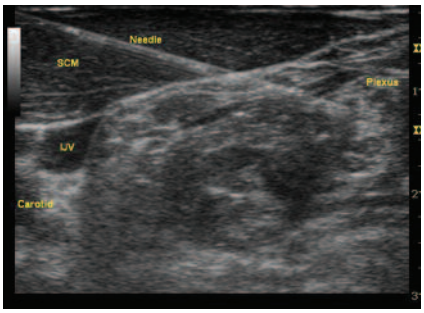

Photo courtesy of A. Robin Brown, MB, ChB.

Doctors insert interscalene block anesthesia needle under ultrasound guidance.

> "In many institutions, the surgeons tell patients to choose general anesthesia rather than a block. Here, it's the other way around."
>
> —*A. Robin Brown, MB, ChB*

The benefits to patients are numerous. The anesthetic effect can last for several hours after the surgery, depending on the local anesthesia used. Patients are still sedated for the surgery, but they wake up alert and pain-free, and don't experience the nausea or sore throat associated with general anesthesia. The surgeons appreciate the reduced bleeding during the procedure and the total muscle relaxation provided by the block. Dr. Brown said that anesthesiologists may also find the procedure personally rewarding.

"If I administer general anesthesia to a patient, and I take them through the surgery and literally save their lives, most of the time they won't remember my name. However, when I perform a spinal, epidural, or peripheral nerve block on a young healthy patient having a minor procedure, they often express their thanks and appreciation. If you walk through the recovery room, you can see the orthopaedic patients who have had major surgery sitting there eating and smiling and chatting away. It's really unbelievably rewarding."

Dr. Brown noted that some surgeons are concerned that performing regional anesthesia will take longer than general anesthesia. However, the equipment, space, and manpower available in an academic environment make the procedure considerably easier than it would be in a private practice. "We have a separate block room—an area that has all the equipment and monitors required to perform regional anesthesia prior to the patient going into the OR. We administer the block in the next patient while the previous patient is still in the OR." Dr. Brown said that although his team used peripheral nerve stimulators in the past, they presently use ultrasound. "You can see the needle as it's advancing toward the nerve bundle, and as you start injecting the local, you can see it surrounding the nerves. You know immediately if you're in the right place. Patients can watch the entire procedure on the monitor if they like."

Other aspects of the technology and technique have improved in the 17 years since Drs. Bigliani and Brown began collaborating. "Now we've advanced to the point of using an interscalene catheter," said Dr. Bigliani, "so we can titrate the amount of pain medication in the post-op period. It's not just a one-shot deal with a total shoulder replacement; while the patient is in the hospital, they can put medicine in on their own with the pump or we can inject some medicine into the catheter that will give them relief for 24 to 48 hours."

Dr. Brown emphasized the importance of additional training for anesthesiologists who are interested in learning about peripheral nerve anesthesia, citing Columbia's year-long fellowship program in regional anesthesia. By increasing anesthesiologists' comfort with these procedures, he suggested more surgeons could be won over, as they have been at New York-Presbyterian/Columbia Orthopaedics. "In many institutions, the surgeons tell patients to choose general anesthesia rather than a block," he said. "Here, it's the other way around."

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glenoid. Clinicians in Europe developed the reverse shoulder prosthesis in response to unmet needs in cuff-deficient shoulder arthritis.

As noted by orthopaedic surgeon Christopher S. Ahmad, MD, "the traditional surgical approach to the problem was to replace the humeral head without resurfacing the glenoid" but this procedure "resulted in less pain relief because the glenoid remained a source of pain and continued to compromise the ability to raise the arm," said Dr. Ahmad. Total shoulder arthroplasty, in which both humeral and glenoid areas are replaced with a traditional non-reverse prosthesis, was abandoned for the cuff-tear patient population, because of instability and loosening of the glenoid component.

According to Dr. Ahmad, the reverse prosthesis "allows for stable resurfacing of the glenoid and also facilitates function, allowing movement of the deltoid muscle to permit patients to lift their arms overhead." Sharing this view is William N. Levine, MD, who observed that "in patients who meet the criteria for the reverse prosthesis, it's a phenomenon. Before surgery, they can't raise their arms at all. After surgery, they can."

According to Louis U. Bigliani, MD, the reverse shoulder prosthesis "gets excellent results when patients are carefully selected." Clinical literature suggests that reverse shoulder surgery may be indicated for patients with primary osteoarthritis of the shoulder and a massive irreparable cuff tear or secondary osteoarthritis with a decompensated cuff deficiency. NewYork-Presbyterian/Columbia Orthopaedics has its own, more specific criteria, one of which was noted by Dr. Bigliani. "In cuff-tear arthropathies, the patient who can raise his/her arm 90 degrees or more is a good candidate for replacement of only the humeral head via hemiarthroplasty. The patient whose arm range is below 90 degrees is a candidate for the reverse shoulder prosthesis."

> "In patients who meet the criteria for the reverse prosthesis, it's a phenomenon. Before surgery, they can't raise their arms at all. After surgery, they can."
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> —*William N. Levine, MD*

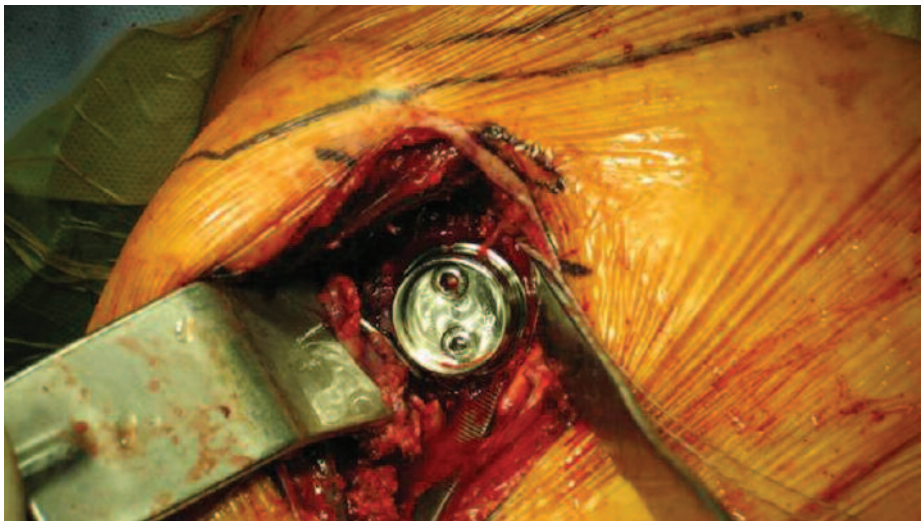

Photo courtesy of William N. Levine, MD.

Surgeons implant the "ball" portion of the prosthesis and its baseplate at the glenoid in the reverse shoulder arthroplasty procedure.

Careful patient selection is important because reverse shoulder arthroplasty can have a high rate of complications. The implant may loosen or parts of the implant may dislocate, in addition to complications that can occur in any orthopaedic surgical setting. Dr. Levine characterized the procedure as "high risk, high reward"—prone to complications, but with "the potential for very good outcomes in patients who often have no other option."

In two initial studies of reverse prosthesis, complications occurred in 24% to 50% of patients (*Techniques Shoulder Elbow Surg* 2005;6:135-149; *J Bone Joint Surg* 2005;87:1476-1486). The studies showed that after reverse shoulder implantation, pain scores were decreased by half or more, with average arm elevations increasing from 42 to 55 degrees preoperatively to 100 to 121 degrees postoperatively.

At NewYork-Presbyterian/Columbia Orthopaedics, patient selection is the key to a low complication rate, said Theodore A. Blaine, MD. "We do not offer the reverse shoulder prosthesis to everybody," he said. "Patients must meet 5 criteria—older than 70 years, rotator cuff tear that cannot be repaired through a muscle-transfer procedure, shoulder arthritis, inability to raise the arm, and pain." Dr. Blaine noted that rigorous patient selection has contributed to keeping his complication rate to less than 5%.

Columbia's orthopaedic surgeons are dedicated to improving the reverse shoulder prosthesis and the procedure for its implantation. The biomechanics laboratory at the Columbia University Center for Orthopaedic Research is performing trials on the durability of various glenoid prosthetic components, and other research teams are conducting follow-up studies to determine the factors that are most important in good arm movement after surgery. "These studies," said Dr. Ahmad, "will directly influence surgical technique and improve outcomes for patients in the future." Columbia researchers at NewYork-Presbyterian are also participating in the development of a new reverse shoulder prosthetic device. The design will reduce glenoid wear, offer a variety of

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angles for placement of the glenoid component, and provide a glenoid baseplate made of trabeculum metal—a material into which bone can grow.

Drs. Bigliani, Ahmad, Levine, and Blaine anchored a research team that studied cuff-tear treatment in patients treated at NewYork-Presbyterian/Columbia Orthopaedics over a 5-year period. The study compared surgical and nonsurgical treatment of patients who, unlike those eligible for the reverse shoulder prosthesis, had rotator cuff disease amenable to operative management by cuff-tear repair or acromioplasty. Operative management resulted in superior pain relief and functional improvement compared with nonoperative management with cortisone injection, physical therapy, and anti-inflammatory drugs. The study, which will be published, was presented at the 2007 annual meeting of the American Academy of Orthopaedic Surgeons.

In the words of Dr. Bigliani, NewYork-Presbyterian/Columbia Orthopaedics is building on "the leadership of decades in shoulder orthopaedics." This leadership formally began in the 1950s with the work of Charles S. Neer, MD, recognized as the father of modern shoulder surgery. This tradition of excellence continues today. "Shoulder surgery started at Columbia," said Dr. Blaine. "Today, we have surgeons who train others in the latest techniques and who can offer all the options, so each patient gets the right treatment."

Drs. Bigliani, Ahmad, Levine, and Blaine anchored a research team that studied cuff-tear treatment in patients treated at NewYork-Presbyterian/Columbia over a 5-year period.

Drs. Levine, Ahmad, and Blaine are the editors of the book, *Minimally Invasive Shoulder and Elbow Surgery*, published in 2007.

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NEWYORK–PRESBYTERIAN
COLUMBIA ORTHOPAEDICS

Important news from NewYork-Presbyterian/Columbia Orthopaedics, at the forefront of research and practice in the diagnosis, treatment, and rehabilitation of musculoskeletal conditions in adults and children.

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